A CASE OF VARICOSE ANEURISM (SACCULATED ARTERIO-VENOUS FISTULE) OF THE THIGH TREATED BY TRANSPERITONEAL LIGATION OF THE EXTERNAL ILIAC ARTERY, WITH REMARKS ON THE NOMENCLATURE OF VASCULAR LESIONS CHARACTERIZED BY PULSATION.[1]

By JOHN B. ROBERTS, M.D.,

OF PHILADELPHIA,

PROFESSOR OF SURGERY IN THE WOMAN'S MEDICAL COLLEGE OF PENNSYLVANIA, AND THE PHILADELPHIA POLYCLINIC.

A NEGRO, twenty-six years of age, was shot in October, 1887, with a pistol of forty-four calibre. The ball entered the right thigh on its inner aspect near the apex of Scarpa's triangle, and passing through the limb made its exit at a point on the outer side at about the same level as the wound of entrance. The course of the missile was posterior to the femur. He bled very freely from the wound, and after it healed experienced no inconvenience except a throbbing at the seat of injury.

In December, 1892, the patient, who had paid no particular attention to the condition of the thigh, applied to Dr. George W. Heinitsch, of Spartanburg, S. C., for a large ulcer situated on the front of the right leg. Dr. Heinitsch found the right leg and thigh much swollen and the superficial veins greatly enlarged. Violent pulsation existed in the thigh and in the superficial veins. I saw the patient in December, 1893. The right leg and thigh were greatly enlarged, being about three times the bulk of the normal leg on the other side. The superficial veins of the leg, thigh, and pubes were greatly hypertrophied and tortuous. A very distinct impulse was felt over the

---

[1] Read before the Section on General Surgery of the College of Physicians of Philadelphia, March 8, 1895.

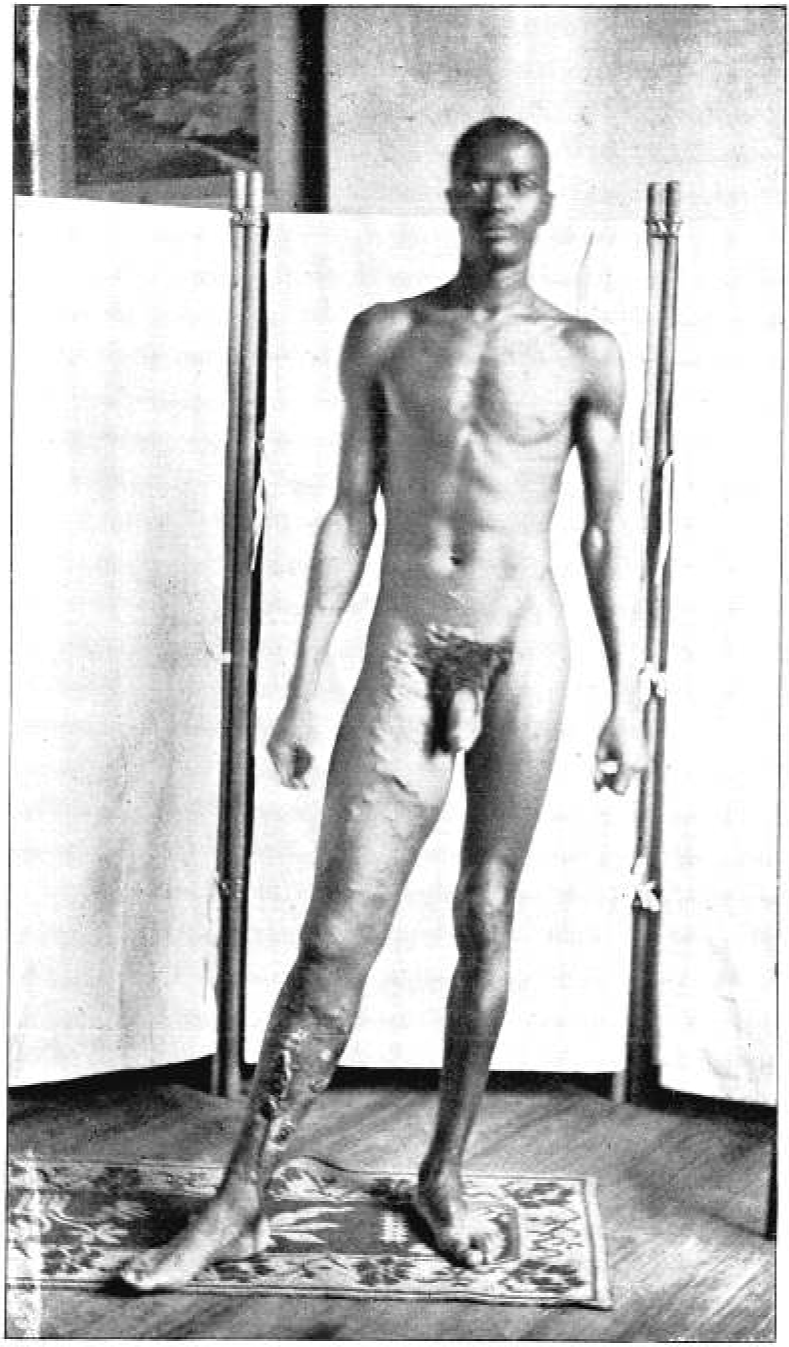

FIG. 1.—Sacculated arterio-venous fistule.

thigh and in the region of Poupart's ligament. Its greatest intensity was at the situation of the scar on the inner side of the thigh. A purring murmur was heard on auscultation, and was most distinct over the course of the femoral vessels about two and a half inches higher than the scar. The murmur was heard also at the seat of the wound of exit, though no impulse was felt in this region. Murmur and pulsation were both distinct in the popliteal space. Pressure on the right external iliac artery caused cessation of pulsation and murmur. The patient had become disabled by the weight and discomfort produced by the swollen limb and the ulcer.

The case was evidently one of arterio-venous fistule produced by a simultaneous wound of the artery and vein. It was impossible to determine that there was a sac between the artery and vein, or that the communication between the two blood-vessels was a direct one.

I called a consultation of my colleagues at the Polyclinic Hospital in order to aid me in deciding what was to be done for the relief of the condition, which was evidently exceedingly serious. The question of cutting down upon the vessels at the seat of the wound of entrance for the purpose of obliterating the orifice of communication was discussed. The probability of gangrene occurring as a result of ligation of the main trunk was also considered, as was the propriety of amputation. The last was discarded because it would have required an amputation close to the hip-joint.

I finally, though with considerable hesitation and with a good deal of doubt as to the outcome, concluded to ligate the external iliac artery by means of incision in the anterior abdominal wall and division of the peritoneum lying in front of the vessel. I arrived at this conclusion because of the impossibility of determining the extent of involvement of the vessels, and because it seemed to me that the arterio-venous communication was situated high up in the thigh, in the neighborhood of Scarpa's triangle. I accordingly ligated the external iliac artery with a silk ligature, reaching the vessel by the transperitoneal method. I closed the sheath of the vessel with catgut. The limb, in which pulsation immediately ceased, was wrapped in absorbent cotton, surrounded by hot-water bottles, and kept somewhat elevated.

The operation was done on January 6, 1894. Gangrene occurred, and the patient died on the sixth day. The propriety of amputation was again carefully considered after the gangrenous process had begun, but was deemed unadvisable. After I came to this conclusion, I put the narrow Esmarch bandage or tourniquet tightly around the thigh at the upper limit of the gangrenous area, with the hope that this constriction might diminish the amount of absorption of septic matter from the tissues, which were becoming devitalized. Incisions were also made in the devitalized region to allow the gases of decomposition to escape.

Post-mortem examination showed that the common iliac and external iliac arteries on the affected side were nearly twice as large as those on the sound side of the body. The femoral artery also was much hypertrophied. A dissection of the specimen, which includes the artery at the point of ligation, shows the arterio-venous communication to have been in Hunter's canal, a considerable distance below the wound of entrance. This surprised me very much. It makes evident the fact that an incision of ordinary length over the point where the bullet entered would not have enabled me to reach the seat of disease, if I had adopted the mode of treatment which is probably best in this form of disease,—namely, to cut down upon the communication and tie the artery on both sides of the orifice.

When the autopsy was made, it at first seemed exceedingly doubtful whether the diagnosis was correct, because the artery and vein in the neighborhood of the injury did not show any communication. Dissection made afterwards revealed that there was a direct communication down near the knee between the hypertrophied femoral vein and the femoral artery, with a small sac connected with the artery, as well as one connected with the vein. The opening between the artery and vein occurred at a point where their walls were close together.

The orifice of communication between the two vessels is like that in aneurismal varix, or simple arterio-venous fistule, but there is a sac connected with each vessel instead of a single sac between the vessels, as is usually found in the disease called varicose aneurism.

A careful examination made after the specimen has been shrunken by a year's preservation in alcohol, shows the artery and vein just above the orifice of communication to be of about the same size, but the wall of the vein is about twice as thick as that of the artery. Each vessel in its collapsed state measures about a half inch in width. The valves of the veins are proportionately hypertrophied.

Below the orifice of communication the vein is of practically the same size as it is above, but the artery is only about one-half as large as above. The walls of the two vessels have about an equal thickness. The vein below the opening is filled with clot, the artery at the same place is occupied by a small loose clot. The vessels are now free from clot above. Their original condition is not known. When the specimen was obtained, gangrene had invaded the region in which the lesion was situated, but the vessels had not been destroyed.

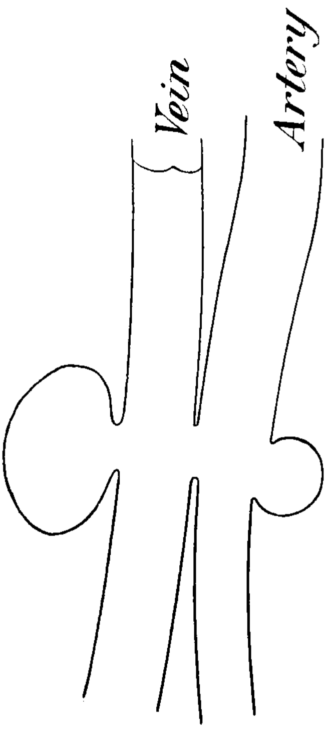

FIG. 2.—Diagram of Roberts's case of sacculated arterio-venous fistule.

The fistule between the artery and vein is a circular opening about three-eighths of an inch in diameter, with smooth edges. The walls of the two vessels above and below, as well as at the opening, are in close contact, and there is no sac between the artery and vein.

In the side of the vein opposite the fistule is another opening nearly as large as the fistule. This is the entrance to a sac, with walls rather thinner than those of the vein, which is lined with a serous membrane resembling the internal coat of the vein. The sac is oval in shape and has a neck where it opens into the calibre of the vein. Its long diameter measures about an inch, and corresponds with the axis of the vein. Its short diameter is about a half inch. In the side of the artery, opposite to the fistulous communication with the vein, there is an opening leading to small dilatation of the arterial wall, which is about a half inch in diameter and is nearly spherical. This sac has not a neck where it joins the vessel, but is located like a sessile growth would be.

The report of this case impels me to say a few words on the confusion which has been produced by the inaccurate employment of the word "aneurism," in the hope that surgeons may be induced to limit the term to one definite condition. I have elsewhere[1] defined an aneurism as a "circumscribed dilatation of one or more of the arterial coats induced by the distending influence of the blood-current upon abnormal vascular walls." This definition includes true spontaneous aneurism and true traumatic aneurism. It intentionally excludes a number of pathological conditions to which has long been applied the term "aneurism," with the addition of adjectives or other descriptive words.

My definition excludes,—

(1) General dilatation with elongation of an artery (called varicose artery or arterial varix, but also called cirsoid *aneurism*).

(2) General dilatation of small arteries and of capillaries (called arterial angeioma, also called *aneurism* by anastomosis).

(3) Arterio-venous communications or fistules (called aneurismal varix, varicose aneurism, and arterio-venous *aneurism*).

(4) Separation of the arterial tunics by the blood-current (usually called dissecting *aneurism*).

(5) Extravasation of arterial blood due to spontaneous rupture (one of the forms of so-called false *aneurism*).

---

[1] Manual of Modern Surgery.

(6) Extravasation of arterial blood due to wounds and injuries (called, by some writers, a form of traumatic *aneurism*).

These widely different pathological conditions often receive, though I think improperly, the name " aneurism," because they are tumors containing blood or blood clots. They present symptoms and require treatment different from true aneurism. Therefore the term " aneurism" in describing them is inaccurate and confusing to student and practitioner.

A more strict application of the name aneurism has long seemed to me desirable, and I have for a number of years adopted the definition given above.

The term " traumatic aneurism," to properly come under the definition which I have offered, must be restricted to three conditions,—

(1) Dilatation of the cicatricial tissue and adjacent arterial wall after a healed penetrating wound of an artery.

(2) Dilatation and hernial protrusion of the uninjured inner coats through a wound of the outer tunic alone.

(3) Dilatation of the outer tunic after an injury producing rupture of the inner coats alone.

The ruptures referred to in the third class are, as a rule, produced only in vessels whose inner coats have been weakened by degenerative changes.

I admit that a limited extravasation of blood from puncture of one of the smaller arteries may become surrounded by an adventitious sac, formed by inflammatory condensation and thickening of the normal areolar tissue. This is sometimes called a " traumatic aneurism," but is really an encysted extravasation of blood or an arterial hæmatoma. A diffuse and burrowing arterial extravasation has even less right to be called an aneurism.

To call either of these conditions a " false aneurism," as is sometimes done, is equally illogical. An aneurism which has to be designated as " false" is certainly not an aneurism.

I would apply the term "arterio-venous fistule" to arteriovenous communications, whether traumatic or spontaneous. The variety in which there is a direct communication, without any sac being formed in connection with the vessels, and which is usually called "aneurismal varix," I would term "simple arterio-venous fistule." The variety which shows the development of a sac between the artery and vein, or in connection with either or both vessels, I would call "sacculated arterio-venous fistule," instead of using the term varicose aneurism.